CLAIMS

What is claimed is:

1.   A method for determining a dither matrix comprising:

(a) transposing multiple pairs of pixels of a parent dither pattern to form at least one candidate pattern;

(b) determining a cost function value for each of the at least one candidate patterns;

(c) selecting at least one low cost pattern corresponding to at least one low cost function value;

(d) reducing the multiple pairs of pixels to transpose;

(e) transposing the reduced multiple pairs of pixels in the selected at least one low cost pattern;

(f) determining a subsequent cost function value for each of the at least one transposed low cost patterns;

(g) selecting at least one subsequent low cost pattern corresponding to at least one subsequent low cost value;

(h) repeating steps (d-g) until a determined cost value threshold is met.

2.   The method as set forth in claim 1, wherein the multiple pairs of pixels are multiples of two.

3.   The method as set forth in claim 1, wherein selecting selects five low cost patterns corresponding to the five lowest cost function values.

4.   The method as set forth in claim 2, wherein reducing reduces the number of pairs of pixels to transpose by a factor of 2.

5.   The method as set forth in claim 1, wherein pixels of each pair of pixels are separated by spacing selected from the group consisting of subdivisions of the pattern and a minimal radial offset.

6.   The method as set forth in claim 5, wherein step (d) further comprises reducing the minimal radial offset each time step (d) is repeated.

7.   The method as set forth in claim 1, wherein the determined cost value threshold comprises determining whether a lowest cost function value of one repetition is below a predetermined percentage of a prior repetition.

8.   The method as set forth in claim 1, wherein the subsequent low cost pattern is used for patterns selected from the group consisting of gray scale dither patterns, three color dither patterns and four color dither patterns.

9.   The method as set forth in claim 1, further comprising increasing the size of the dither patterns to have better invariance to tiling operations.

10.   The method as set forth in claim 1, further comprising selecting said parent dither pattern to include selecting randomly half of the parent dither pattern to be black.

11.   The method as set forth in claim 5, wherein subdivisions are quadrants of the pattern.

12.   A system comprising:
a parent dither pattern comprising pixels;
a processor coupled to receive the parent dither pattern, said processor transposing multiple pairs of pixels of a parent dither pattern to form at least one candidate pattern; determining a cost function value for each of the at least one candidate patterns; selecting at least one low cost pattern corresponding to at least one low cost function value; reducing the multiple pairs of pixels to transpose; transposing the reduced multiple pairs of pixels in the selected at

least one low cost pattern; determining a subsequent cost function value for each of the at least one transposed low cost patterns; selecting at least one subsequent low cost pattern corresponding to at least one subsequent low cost value, and performing iterations of reducing, transposing determining and selecting until a determined cost value threshold is met.

13. The system as set forth in claim 12, wherein the multiple pairs of pixels are multiples of two.

14. The system as set forth in claim 12, wherein selecting selects five low cost patterns corresponding to the five lowest cost function values.

15. The system as set forth in claim 13, wherein reducing reduces the number of pairs of pixels to transpose by a factor of 2.

16. The system as set forth in claim 12, wherein pixels of each pair of pixels are separated by spacing selected from the group consisting of subdivisions of the pattern and a minimal radial offset.

17. The system as set forth in claim 16, wherein reducing further comprises reducing the minimal radial offset for each iteration.

18. The system as set forth in claim 12, wherein the determined cost value threshold comprises a lowest cost function value of one repetition which is below a predetermined percentage of a prior repetition.

19. The system as set forth in claim 12, wherein the subsequent low cost pattern is used for patterns selected from the group consisting of gray scale dither patterns, three color dither patterns and four color dither patterns.

20.   A computer readable medium comprising instructions, which when executed by a processing system perform the method comprising:

(a) transposing multiple pairs of pixels of a parent dither pattern to form at least one candidate pattern;

(b) determining a cost function value for each of the at least one candidate patterns;

(c) selecting at least one low cost pattern corresponding to at least one low cost function value;

(d) reducing the multiple pairs of pixels to transpose;

(e) transposing the reduced multiple pairs of pixels in the selected at least one low cost pattern;

(f) determining a subsequent cost function value for each of the at least one transposed low cost patterns;

(g) selecting at least one subsequent low cost pattern corresponding to at least one subsequent low cost value;

(h) repeating steps (d-g) until a determined cost value threshold is met.

21.   The computer readable medium as set forth in claim 20, wherein the multiple pairs of pixels are multiples of two.

22.   The computer readable medium as set forth in claim 20, wherein selecting selects five low cost patterns corresponding to the five lowest cost function values.

23.   The computer readable medium as set forth in claim 21, wherein reducing reduces the number of pairs of pixels to transpose by a factor of 2.

24.   The computer readable medium as set forth in claim 20, wherein pixels of each pair of pixels are separated by spacing selected from the group consisting of subdivisions of the pattern and a minimal radial offset.

25.   The computer readable medium as set forth in claim 24, wherein step (d) further comprises reducing the minimal radial offset each time step (d) is repeated.

26.   The computer readable medium as set forth in claim 20, wherein the determined cost value threshold comprises determining whether a lowest cost function value of one repetition is below a predetermined percentage of a prior repetition.

27.   The computer readable medium as set forth in claim 20, wherein the subsequent low cost pattern is used for patterns selected from the group consisting of gray scale dither patterns, three color dither patterns and four color dither patterns.

28.   The computer readable medium as set forth in claim 20, further comprising increasing the size of the dither patterns to have better invariance to tiling operations.

29.   The computer readable medium as set forth in claim 20, further comprising selecting said parent dither pattern to include selecting randomly half of the parent dither pattern to be black.

30.   The computer readable medium as set forth in claim 24, wherein subdivisions are quadrants of the pattern.